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ABSTRACT

A summary of an Extension Education dissertation on a study to develop a framework of curriculum and learning theory features, to determine needs of Extension agents, and to show its application to dairy science is presented. Tyler's rationale for deriving educational objectives (curriculum theory) and Bloom's taxonomy of cognitive behavior (learning theory) were used in the study. Data were collected from 20 Extension agents engaged in dairy work in Louisiana, five state specialists in dairy and veterinary science and 86 dairymen over the state. Data was analyzed on agent cognitive ability and relative work value of dairy science concepts. Views of agents and specialists were compared to the extent of congruence. Conclusions and suggestions for further study were important. (NF)

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A CONCEPTUAL FRAMEWORK FOR DETERMINING TRAINING NEEDS OF EXTENSION AGENTS APPLIED TO DAIRY SCIENCE

by

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A summary of an Ed.D. Dissertation in Extension Education prepared under the supervision of Dr. L. L. Pesson, Louisiana State University, December, 1971.

A copy of the complete dissertation is on file in the main library at Louisiana State University.

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Objectives of the Study

Continued professional improvement, through in-service training, is essential to keep pace with the rapid social and technological changes in modern society. Cooperative Extension Services in the United States, generally, have emphasized in-service training and based such programs on professional needs, evaluated in terms of subject matter, programs and job performance. Intellectual or cognitive ability of Extension professionals in relation to job specialization as a means of determining training needs is an area of limited research. The major objective of the study, therefore, was to develop a conceptual framework integrating selected features of curriculum and learning theory for determining cognitive needs of Extension agents and to demonstrate the application of this model to the discipline of dairy science.

A subsidiary objective of the study was to study the operational aspects of the parish and area systems of dairy work in Louisiana.

Area Extension work has been commended as a means of meeting more satisfactorily than the traditional parish system the technological needs of an increasingly specialized clientele. At the same time, skepticism has been expressed regarding its effect on traditional agent-client relationships. These were the major considerations in examining the parish and area systems of dairy work in the state.

Research Design

Tyler's rationale for deriving educational objectives (curriculum theory) and Bloom's taxonomy of cognitive behavior (learning theory)

were used along with the element of work effectiveness to build the conceptual framework used in the study (Figure 1).

In applying this framework to the field of dairy science, data was collected from 20 Extension agents engaged in dairy work in Louisiana, five state specialists in dairy and veterinary science, and 86 dairymen over the state.

The data was analyzed on two major dimensions, namely, agent cognitive ability and relative work value of dairy science concepts. Concepts which had been developed in the three major dairy science disciplines--breeding, nutrition and management--were rated by agents and specialists in terms of importance in the job of the agent and were also tested on agents at three levels of cognitive behavior.

Three dimensions of agent cognitive ability, comparing parish and area dairy agents, were studied (Figure 2). Overall cognitive ability in dairy science was correlated with agent characteristics and discipline cognitive ability with concept ratings. Agent performance at three cognitive levels, namely, knowledge, comprehension-application, and analysis-synthesis-evaluation, was incorporated into a behavior-content matrix to compare the present ability of parish and area agents and to relate this to expected ability.

The views of agents and specialists with regard to the job importance of dairy science concepts were compared to see the extent of congruence.

Agent Cognitive Ability

Area agents scored slightly higher than parish agents in all

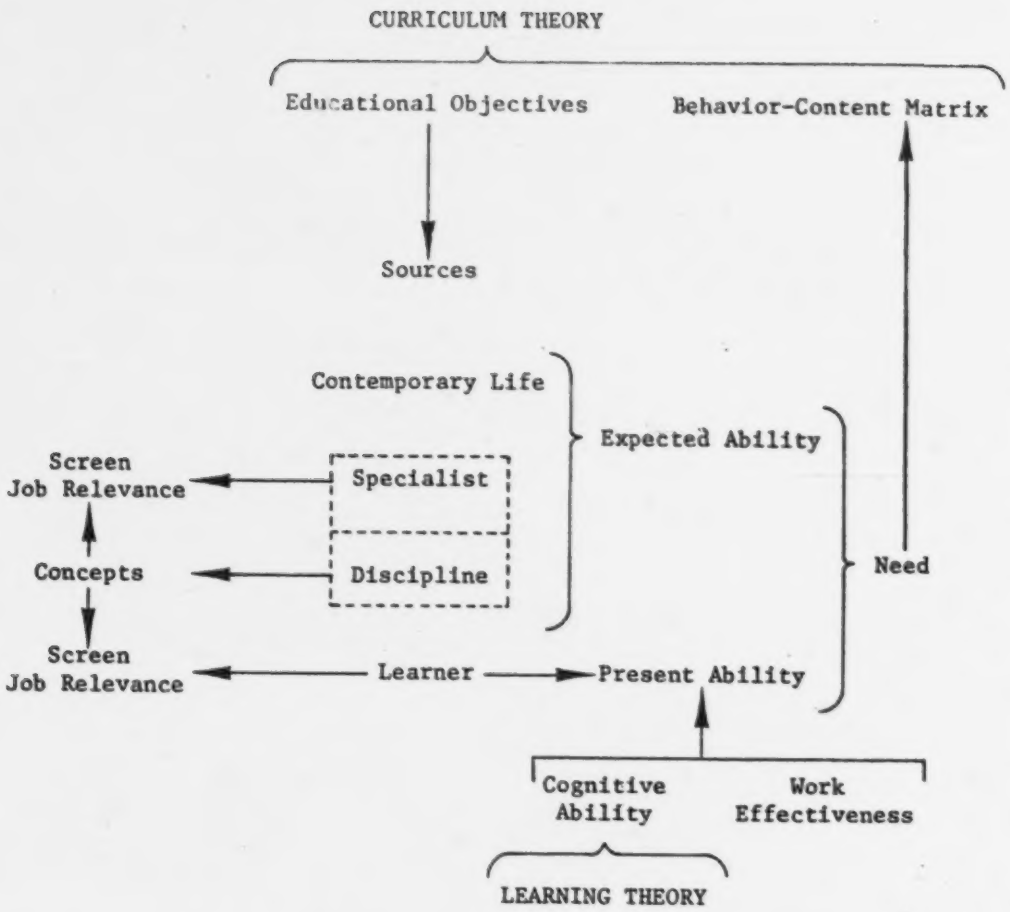

Figure 1. The Research Model

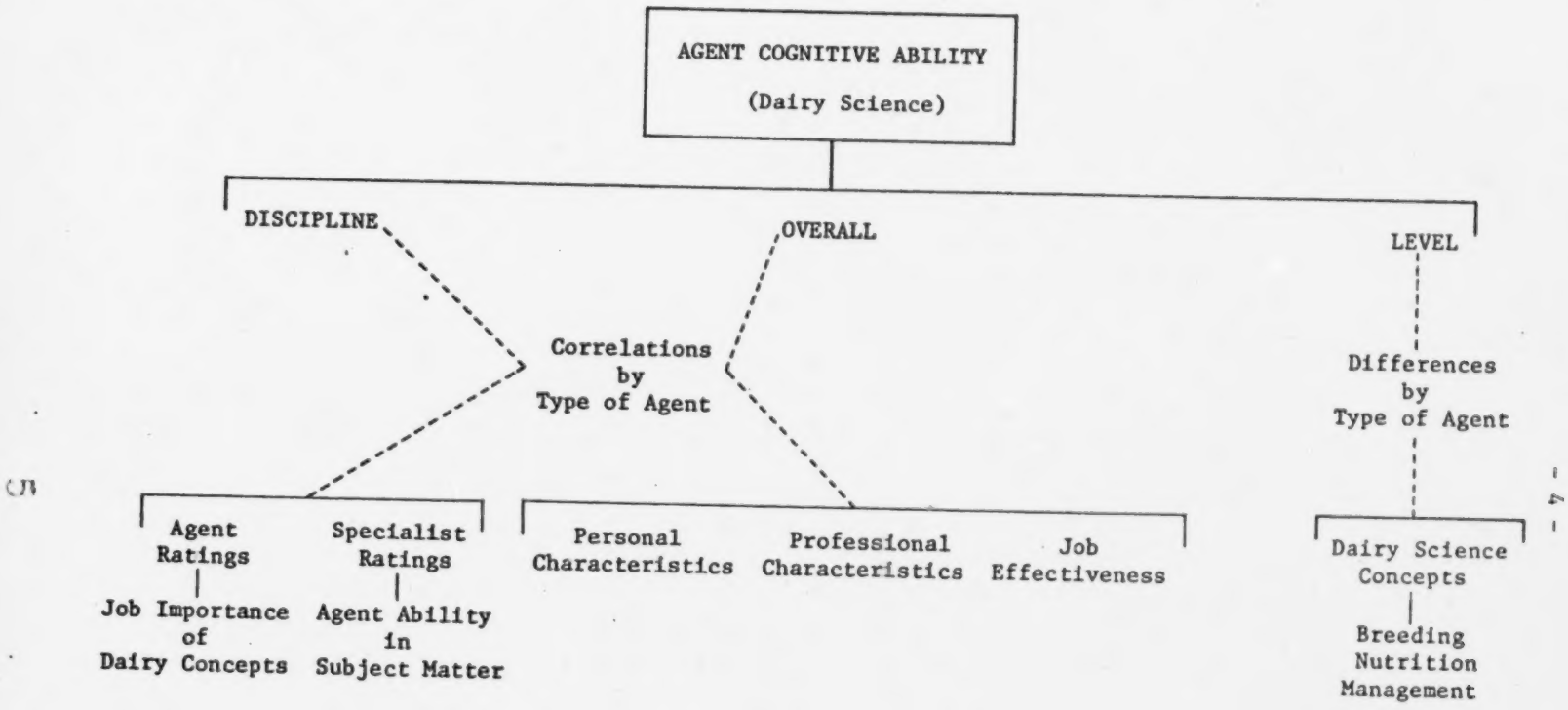

Figure 2. Dimensions of Agent Cognitive Ability and the Relationships Studied

the three disciplines and consequently had a higher overall score. The greatest difference was in nutrition (8.3 percent) and the smallest in management (1.5 percent), with an overall difference of 4.5 percent. None of these differences was statistically significant.

Differences between the two agent types were somewhat greater at specific discipline-cognitive behavior level combinations. For example, area agents compared with parish agents had significantly greater evaluative ability in nutrition (15.6 percent, $P < .01$), perceptibly higher comprehension-application ability in management (9.5 percent), and better knowledge of management (15.6 percent) and overall subject matter (11.1 percent). At all other behavior levels, parish and area agents tended to be alike in ability.

Extending the comparison to cognition of the several dairy science concepts sampled, major differences (exceeding ten percentage points) were observed in 20 out of the 35 concept-cognitive level combinations, or approximately 57 percent. Area agents were superior in 14 instances, four of which were statistically significant, and parish agents in the remaining six, of which two cases were statistically significant. The superiority of either type of agent in the several concepts at the three cognitive levels is indicated below:

		No. of Concepts in Which Agent Had Better Ability	
	Cognitive Level	Area Agent	Parish Agent
1.	Knowledge	6	2
2.	Comprehension-Application	4	1
3.	Analysis-Synthesis-Evaluation	4	3

In summary, area agents tended to have slight to fair superiority in cognitive ability in the disciplines of breeding, nutrition and management, and in a larger proportion of discipline-cognitive level and concept-cognitive level combinations than did the parish agents, and registered a higher incidence of statistically significant differences. Greater job specialization could be partly responsible for differences favoring the area agents. A number of other factors may also be involved. These were studied by correlating overall cognitive ability with agent characteristics.

Higher levels of ability in both types of agents were associated with lower age, fewer contacts with specialists and research staff, superior academic performance, and higher estimates by dairymen about their competencies. The pattern of relationship with regard to the remaining characteristics varied with the type of agent, parish and area agents invariably showing opposite correlations. Parish agents with higher ability, compared with those having lower ability, had longer tenure in Extension, dairy and supervisory work, had membership in more professional associations, referred to a larger number of information sources and journals, and received significantly higher ratings from specialists on specific job abilities. At the same time, they participated in fewer training activities, collaborated with a smaller number of professional associations, and spent less time seeking out new information. Area agents showed opposite correlations to parish agents on all these characteristics. The contradictory correlation patterns for the two agent types were ascribed to such personal/situation-oriented factors as inclination, time, opportunity, etc. It was thus

inferred that agent characteristics, as a rule, could not be regarded as reliable indices of cognitive ability/training need.

The performance of parish and area agents at the concept-cognitive level combinations sampled was incorporated into a behavior-content matrix of present ability. When this was compared with expected ability, a discrepancy was invariably observed, indicating that no single concept had been fully mastered; furthermore, the discrepancy was noticed in more concept-cognitive level combinations in the case of parish agents than area agents, suggesting the need for differential training emphases for the two types of agents.

Pursuing cognitive ability further, it was anticipated that agents with high ability would tend, in terms of job importance, to rate more importantly a larger number of discipline concepts, and that they, in turn, would be estimated more highly on subject matter ability by specialists. As it turned out, however, neither of the two sets of correlations followed a pattern.

Both parish and area agents were inconsistent in their ratings. Parish agents with higher ability rated two out of three conceptual frameworks (discipline) more highly, while area agents with higher ability rated only one such conceptual framework.

Specialist estimates of agent ability did not correspond with actual agent performance entirely. While there was fair to good agreement between specialist ratings and the tested cognitive ability of parish agents in the three disciplines, there was a significant negative correlation in the case of area agents in two disciplines.

In view of the conflicting results, neigher agent ratings of the

job importance of dairy science concepts nor specialist ratings of the subject matter ability of agents appear to be reliable indices of the cognitive ability of agents.

Job Importance of Dairy Science Concepts

Job importance ratings of dairy science concepts were considered as an additional index of training need.

Specialists and agents agreed that management concepts were most important, followed by nutrition and breeding.

Milk quality, dairy records and herd health were rated within the top five management concepts by agents and specialists alike. Adaptation and sire selection were ranked towards the bottom of the scale. There was some measure of disagreement with regard to the relative importance of the remaining concepts.

Parish and area agents were quite close on their respective ratings of nutrition concepts. They considered balancing rations, feeding standards, feed evaluation systems and feed efficiency as the more important concepts and ruminant digestion, nutrient absorption and metabolism and feeding management as less important. Specialists tended to diverge to some extent from the agents; for example, they considered feeding management to be more important than balancing rations and digestion more so than nutrient absorption and metabolism.

Disagreement between agents and specialists was more marked in their ratings of two breeding concepts. Agents ranked artificial insemination at the top while specialists felt it least important, considering that breeding technicians assist dairymen in this activity more than agents. Similarly, selection was considered relatively

unimportant by agents but specialists felt otherwise.

In the context of training emphasis, the respective rankings of the two types of agents logically are a reliable index of training priorities as seen by them. The next step is to compare the two sets of rankings with specialist ratings. Where there is significant disagreement on the relative importance of some concepts, it would be appropriate to give more weight to specialist ratings.

The data on cognitive ability in dairy science concepts and the relative work value of these concepts can be integrated into a design for in-service training of agents. Deficiencies in the intellectual map of agents in various concept-cognitive level combinations have been identified. Similarly, the concepts that are considered more important than others have been indicated. With this information, it would be possible to assign priority in terms of training emphases to the several concepts at various cognitive behavior levels with a reasonable degree of confidence that real educational needs and objectives will be satisfied.

The Area Dairy System

Fifty-three dairymen in the parish system and 33 dairymen in the area system commented upon various aspects of the dairy programs of the Cooperative Extension Service. Relative operation of the two systems and the attitude of dairymen within the area system were studied.

The area system of dairy work was reportedly superior to the parish system with regard to two program areas, complete feed and mastitis control, one problem area, disease control, and more frequent agent

visitation. On the other hand, the parish system was better than the area system with regard to problem-solving help in forage testing, and the greater reliance on the parish agent for subject matter help. No differences were observed between the two systems in 10 program areas, 10 problem areas, agent availability and the value of agent information. It would appear that the area and parish systems did not differ very much in the efficacy of various operations. Considering that area dairy work is fairly recent and that training effort for area staff specialization has been limited, the small difference is not surprising. Whatever differences may have been observed may not also be the effect of the system, per se, but could be caused by a number of factors, such as differential agent ability, differences among dairymen, etc. Furthermore, the frame of reference on which the study is based is the opinion of dairymen, which by itself is rather subjective and can cause further variation in the results.

The attitude of dairymen towards area dairy work was compared in two of the three Extension districts into which the state is divided, namely the Northern and Southeastern Districts. Dairymen in the Southeastern District had a more favorable attitude (significant at .05 level). Five types of experiences were summarized into attitude. On all of these experiences, dairymen in the Southeastern District registered a more favorable attitude than dairymen in the Northern District. Attitude differences were statistically significant for two of these experiences, program effectiveness and attending out-of-parish meetings. For the remaining experiences, specialized help from agents, facility of contact with agents, and preserved "identity" of the parish,

considerable difference in attitude was observed.

The more favorable attitude of dairymen in the Southeastern District could be the result of continued single-county responsibility for the area agents in this district, the relatively higher proportion of time that they devote to dairy work, and the relatively smaller-sized dairy operations in the district. At the same time, agents in the Southeastern District are responsible to about four times the audience size in the Northern District, and this could adversely affect dairymen's attitudes. This is compensated, however, by the fact of single-county responsibility of the area agents in the Southeastern District so that dairymen probably continue to identify the area agent with the traditional parish system. Area agents in the Northern District, on the other hand, have multi-county responsibility and may have encountered more of those problems which are peculiar to an enlarged area of operation. In view of these circumstances, it would appear that the attitude of dairymen observed in the study is a reflection not of the working of the area system in the two districts, but rather of the dairy program as such.

Conclusions

Training Development Process

The conceptual framework used in the study as a training development procedure has a sound theoretical base and was scientifically and successfully applied to a technical discipline. The process was reliable and valid in sampling desired intellectual behaviors and opinions by virtue of pretest and expert judgement. It is suggested that the procedure be extended to other technical disciplines for possible

refinements and/or increasing its reliability and validity as an analytical tool.

The analytical procedure should be tried in process areas such as programming, teaching-learning, communication, etc. to see what modificationss, if any, are needed.

The process indicated is a unique effort and should compare favorably with training development procedures which have been generally followed. It has the singular advantage of direct, in-depth assessment of relevant cognitive behavior and yields a more reliable index of training need than indirect evaluations.

The process can be commended for objectivity in evaluating professional abilities and for specificity in comparing a range of concept-cognitive level combinations in terms of expected competencies. The result is a more reliable and meaningful program of in-service training.

Some important questions that arise in the use of this framework are:

1. Is the "real" norm of expected ability typically job-related to the extent that individual considerations and judgements can be overlooked?
2. What is the emotional reaction among professionals to ability evaluation?
3. What are the administrative/supervisory implications of the extended long-term application of training development processes of this nature?
4. What is the role of staff development specialists in decisions about and organization of training development

procedures?

Training Content

The concept of differential training priorities and emphases is related basically to job requirements and the cognitive ability needed to meet these requirements.

Degree of job specialization, relative use and cognitive ability should dictate the number and complexity of concepts that are incorporated into training programs. Hypothetically, parish and area agents in Extension work could be at variance on all these criteria.

The study revealed real to significant differences between parish and area dairy agents in cognition of a number of concepts and the job importance ratings of dairy science concepts. Training content for these groups should consider these differences in order to plan for differential training emphases. Subject matter specialists should play a significant leadership role with regard to current and future training of dairy agents.

The Parish-Area Systems of Dairy Work

The study showed that dairymen in the area system had a slightly better opinion about the effectiveness of some aspects of dairy work than those in the parish system. The difference was too small to make valid conclusions about relative superiority. Area dairy work is quite recent, so that dairymen may not be fully aware of its implications and felt its possible impact. In addition, there is little difference in dairy specialization between parish and area agents. These and other factors are implicated in the observed results.

The significantly favorable attitude of dairymen in the

Southeastern District, compared with the Northern District, is not a completely reliable index of the working of the area system, per se. Factors such as single-county responsibility which leads to better client identification, smaller dairy operators, etc. could well have contributed to the differences.

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